

Differential Sets

Fulvia fulva (now *Passalora fulva*) - Tomato

The relationship between races of *Fulvia fulva* and resistance genes

The current name has changed from *Fulvia fulva* to *Passalora fulva* but *Cladosporium fulvum* and *Fulvia fulva* are still in use. The resistance genes take their name from the old name of the pathogen.

Not all *Cf* genes are used in commercial varieties. The most commonly used ones are: *Cf-2*, *Cf-4*, *Cf-5* and *Cf-9*. *Cf-9* seems to be particularly effective as races overcoming it (e.g. race 2.5.9) have not spread in the last 15 years.

Fulvia fulva races have been named using a scientific system and Hubbeling (1978) introduced a system of grouping them. This system is used in the UPOV protocol for testing tomato varieties, as it is based on the most commonly used genes. The correspondence between the races and race groups is indicated in the table annexed to this document.

An alternate coding system is used by some companies and corresponds to the Hubbeling groups, races and genes as follows:

Codes used by companies		Races	Genes	ISF Code ¹
Group Identifier	Group(s)	(see annex for complete set)		
C1	A	2	<i>Cf-1</i>	Ff: 2
Cbd	B, D	4 and 5	<i>Cf-2</i>	Ff: 2, 4
C2	A, B, D	2, 4 and 5	<i>Cf-2</i> , <i>Cf-4</i>	Ff: 2, 4, 5
C3	A, B, C	2, 4, 1.2.4 and 2.4	<i>Cf-5</i>	Ff: 2, 4, 1.2.4, 2.4
C4	A, B, C, D	2, 4, 1.2.4, 2.4 and 5	<i>Cf-2</i> , <i>Cf-4</i> , <i>Cf-5</i>	Ff: 2, 4, 1.2.4, 2.4, 5
C5	A, B, C, D, E	2, 4, 1.2.4, 2.4, 5 and 2.4.5	<i>Cf-9</i>	Ff: 2, 4, 1.2.4, 2.4, 5, 2.4.5

References

Hubbeling, N. 1978. Breakdown of resistance to the *Cf-5* gene in tomato by another new race of *Fulvia Fulva*. Mededelingen van de Faculteit Landbouwwetenschappen, Universiteit Gent 42/2.

Latterot, H. 1986. Race 2.5.9, a new race of *Cladosporium fulvum* (*Fulvia fulva*) and sources of resistance in tomato. *Netherlands Journal of Plant Pathology* 92: 305 - 307.

Latterot, H. 1981. *La lutte génétique contre la Cladosporiose de la tomate en France*. PHM *Revue Horticole*, N 214, February 1981

Lindhout, P., Korta, W., Cislik, M., Vos, I. and Gerlagh, 1989. Further identification of races of *Cladosporium fulvum* (*Fulvia fulva*) on tomato originating from the Netherlands, France and Poland. *Netherlands Journal of Plant Pathology* 95: 143-148.

UPOV 2001. Guidelines for the conduct of tests for Distinctness, Uniformity and Stability – Tomato (*Lycopersicon lycopersicum* (L) Karsten ex Farw) (http://www.upov.int/en/publications/tq-rom/tq044/tq_44_10.pdf)

¹ The code used by the vegetable industry for the pathogen is Ff (see http://www.worldseed.org/isf/pathogen_codes.html)

Aoxue Wang, Fanjuan Meng, Xiangyang Xu, Yong Wang and Jingfu Li 2007. Development of molecular markers linked to *Cladosporium fulvum* resistant gene *Cf-6* in tomato by RAPD and SSR methods. *HortScience* 42(1): 11-15. 2007.

For more information contact the ISF Secretariat at isf@worldseed.org

NOTE: ISF has done its best to provide information that is up-to-date and published in refereed journals, and therefore accepts no liability for the use of this information.



International Seed Federation

Annex 1

		Race →														
		0*	1	2*	3	4*	1.2.4	2.4*	5*	2.3.4.5	2.4*	2.5*	2.4.5*	2.5.9*	2.4.5.9	1.2.3
				A		B	C			D			E			
Variety	Resistance Gene															
- Monalbo - Moneymaker - Motelle	none	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
- Stirling Castle - Leaf Mould Resister	<i>Cf-1</i>	R	S	R	R	R	S	R	R	R	R					S
Vetomold	<i>Cf-2</i>	R	R	S	R	R	S	S	R	S	S	S	S	S	S	S
V121	<i>Cf-3</i>	R	R	R	S	R	R	R	R ¹	S	R	R	R	R	R	S
Purdue 135	<i>Cf-4</i>	R	R	R	R	S	S	S	R	S	S	R	S	R	S	R
- IVT 1149 - PI 187002-1 - Ontario 7717	<i>Cf-5</i>	R	R	R	R	R	R	R	S	S	R	S	S	S	S	R
- F77-38 (also called Ontario 7818)	<i>Cf-6</i>	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
- IVT 1154 - Ontario 7719	<i>Cf-9</i>	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R
Vagabond	<i>Cf-2, Cf-4</i>	R	R	R	R	R	S	S	R	S	S	R	S	R	S	R
- F1 Vetomold x IVT 1149	<i>Cf-2, Cf-5</i>	R	R	R	R	R	R	R	R	S	R	S	S	S	S	R
- F1 Vagabond x IVT 1149	<i>Cf-2, Cf-4, Cf-5</i>	R	R	R	R	R	R	R	R	S	R	R	S	R	S	R
- F1 Vagabond x Ontario 7719	<i>Cf-2, Cf-4, Cf-9</i>	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R

Note: * Races most frequently used by breeders; ¹ resistance is partial